भारतीय मानक
Indian Standard

IS 2802 : 2022

(*Superseding IS 10501 : 1983*)

आइस क्रीम और कुल्फी — विशिष्टि

(पहला पुनरीक्षण)

Ice Cream and *Kulfi* — Specification

(First Revision)

ICS 67.100.40

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Dairy Products and Equipment Sectional Committee, FAD 19

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Dairy Products and Equipment Sectional Committee had been approved by the Food and Agriculture Division Council.

Ice cream and *Kulfi* are widely consumed food items and are recognized medium to help increasing the milk intake. Ice cream and *Kulfi* of good quality can never be produced from raw materials which are initially of poor hygienic quality irrespective of the subsequent methods of treatment or handling.

It is, therefore, important to exercise utmost care in obtaining ingredients of good hygienic quality which will satisfy the physical, chemical and microbiological standards prescribed for the finished products.

This standard was originally published in 1964 with the title 'Specification for ice-cream'. A separate standard IS 10501 : 1983 'Specification for *kulfi'* was formulated. *Kulfi* is a typical indigenous frozen dairy product which is traditionally prepared by concentrating milk in large open pan kept over a fire hearth and then stirred with required amount of sugar, colour and flavour. The mix after cooling is filled in appropriate containers and then frozen.

This revision has been brought out to club the requirements of ice cream and *Kulfi* into single standard since the composition of these products are similar and to harmonize the product requirements with the *Food Safety and Standards (Food Products Standards and Food Additives) Regulations*, 2011.

Kulfi is a traditional frozen dairy product of India which is prepared by concentrating milk about two folds by continuous heating, addition of sugar, nuts etc., filling the mix in moulds and freezing.

The main difference between *Kulfi* and ice cream is that *Kulfi* has no or negligible overrun. The major changes brought out through this revision include:

a) Requirements of ice cream and *Kulfi* have been clubbed into a single standard;
b) Description of the product has been updated;
c) In line with the *Food Safety and Standards (Food Products Standards and Food Additives) Regulations*, 2011, the specifications for medium fat and low fat varieties of ice cream and *Kulfi* have also been incorporated;
d) Microbiological requirements have been aligned with the with the *Food Safety and Standards (Food Products Standards and Food Additives) Regulations*, 2011;
e) Packing and marking clause has been updated; and
f) Requirement of milk protein has been incorporated.

Upon publication of this standard, IS 10501 : 1983 shall stand withdrawn.

In the formulation of this standard, due consideration has been given to the provisions of the *Food Safety and Standards Act*, 2006 and the Rules and Regulations framed thereunder and the *Legal Metrology (Packaged Commodities) Rules*, 2011. However, this standard is subject to the restrictions imposed under these, wherever applicable.

The composition of the Committee responsible for formulation of the standard is given in Annex F.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

ICE CREAM AND *KULFI* — SPECIFICATION

(*First Revision*)

1 SCOPE

This standard prescribes the requirements and the methods of test for ice cream and *Kulfi*, with or without incorporation of non-dairy ingredients either singly or in combination.

2 REFERENCES

The standards listed in Annex A contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of these standards.

3 TERMINOLOGY

3.0 For the purpose of this standard, the following definition shall apply.

3.1 Ice cream and *Kulfi* mean the frozen food made from heat-treated mix (*see* **7.2.2.1**) made out of milk (as defined under IS 13688), cream and/or other milk products with or without sweetening ingredients, egg and egg products, water, fruit and fruit products, nuts, chocolate, cocoa, coffee, confectionery, condiments, spices, ginger, bakery products such as cakes or cookies, permitted stabilizers and emulsifiers, edible common salt, permitted flavouring and colouring matter. The product may contain incorporated air and shall be frozen hard except in case of softy ice cream, where it can be frozen to a soft consistency.

4 TYPES

Ice cream or *Kulfi* shall be of following types based on the fat content:

a) Ice cream or *Kulfi*;
b) Medium fat ice cream or *Kulfi*; and
c) Low fat ice cream or *Kulfi*.

5 RAW MATERIALS

5.1 The following are the essential raw materials for the manufacture of ice cream and *Kulfi*.

a) Milk (as defined in IS 13688) and milk products.

5.2 Optional Ingredients

5.2.1 The product may contain the following optional ingredients:

a) Sugar (conforming to IS 1151) and other nutritive sweeteners (e.g. jaggery, dextrose, fructose, liquid glucose, dried liquid glucose, high maltose corn syrup, honey etc.);

b) Iodized salt (conforming to IS 7224);

c) Potable water (conforming to IS 10500);

d) Starch, provided it is added only in amounts functionally necessary as governed by Good Manufacturing Practice, taking into account the use of any stabilizers or thickeners permitted under the *Food Safety and Standards (Food Products Standards and Food Additives) Regulations*, 2011; and

e) Other non-dairy ingredients: fruit and fruit products, eggs and egg products, coffee, cocoa, chocolate, confectionary, condiments, spices, ginger and nuts; bakery products, such as cake or cookies.

Note — All ingredients used shall be clean and in every way fit for human consumption.

6 REQUIREMENTS

6.1 Odour and Flavour

The product shall have a pleasant odour and flavour.

6.2 Texture and Appearance

The product shall be smooth in texture and appearance, of a uniform consistency and shall have no apparent ice or lactose crystals. It shall be, as far as possible, free from butter fat granules.

6.3 Freedom from Dirt

The product shall be free from dirt and such other foreign material. All ingredients used shall be clean, whole some and in every way fit for human consumption.

6.4 No fat other than milk fat shall be present in the product with the exception of that derived from eggs, cocoa, nuts, bakery products and emulsifiers.

6.5 The product shall conform to the requirements given under Table 1 and Table 2.

Table 1 Requirements for Ice Cream and *Kulfi*
(*Clause* 6.5)

Sl No.	Characteristic	Requirement			Method of Test, Ref to
		Ice Cream or *Kulfi*	**Medium Fat Ice Cream or *Kulfi***	**Low fat Ice Cream or *Kulfi***	
(1)	(2)	(3)	(4)	(5)	(6)
i)	Weight, in grams per litre, *Min*	525.0	475.0	475.0	Annex B
ii)	Total solids, percent by weight, *Min*	36.0	30.0	26.0	IS 12333
iii)	Milk fat, percent by mass	*Min* 10.0	More than 2.5 and less than 10.0	*Max* 2.5	IS 11762
iv)	Milk protein, percent by mass, *Min*	3.5	3.5	3.0	IS 11917
v)	Acidity percent (as lactic acid), *Max*	0.25	—		**14** of IS 1479 (Part 1)
vi)	Sucrose, percent by mass, *Max*	16.0	16.0	16.0	Annex C* or IS 11764
vii)	Phosphatase test of mix	Negative	Negative	Negative	IS 8479 (Part 1)

NOTES

1 In case of dispute, the method indicated by '*' shall be the referee method.

2 The acidity of the ice cream or *Kulfi* shall be determined before the addition of colouring matter. Use 20 g of the prepared sample being diluted with about 50 ml of recently boiled cooled water.

3 For ice cream or *Kulfi* containing fruits and chocolate, sucrose content may be 17 percent *Max*.

4 For phosphatase test, use the mix sample before nuts, fruits, or flavouring and colouring materials have been added. While testing finished ice cream or *Kulfi*, strain out any nuts or fruits before testing. Run an extra control with each individual sample to evaluate colour causes by flavouring materials.

Table 2 Microbiological Requirements for Ice Cream and *Kulfi*

(*Clause* 6.5)

Sl No.	Characteristic	Requirement				Method of test, Ref to
		Sampling Plan		Limit (cfu)		
		n	c	m	M	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Aerobic plate count	5	3	1 x 10^5/g	2 x 10^5/g	IS 5402 (Part 2)
ii)	Coliform count	5	3	< 10/g	10/g	IS 5401 (Part 1)
iii)	*Staphylococcus aureus* (Coagulase positive)	5	2	10/g	1 × 10^2/g	IS 5887 (Part 8/Sec 1* or Sec 2)
iv)	*Salmonella sp.*	5	0	Absent/25 g	—	IS 5887 (Part 3/Sec 1)
v)	*Listeria monocytogenes*	5	0	Absent/g	—	IS 14988 (Part 1)
vi)	*Bacillus cereus*	5	3	5 x 10^2 g	1 x 10^3/g	IS 5887 (Part 6)
vii)	*Sulphite reducing clostridia*	5	3	50/g	1 x 10^2/g	ISO 15213
viii)	*E. coli*	5	0	Absent/g	—	IS 5887 (Part 1) or IS 16424*

NOTES

1 For sampling plan, *see* Annex D.

2 In case of dispute, the method indicated by '*' shall be the referee method.

3 The requirement for *Salmonella* shall be tested in a laboratory situated away from the production area.

6.6 Food Additives

6.6.1 Colouring matter and flavouring agents as permitted under the *Food Safety and Standards (Food Products Standards and Food Additives) Regulations*, 2011 may be added. The colour and the flavour to be added shall be as desired by the purchaser.

6.6.1.1 Vanilla extracts and various artificial or imitation flavours, if used, should be added to the mix after pasteurization. As most of them are prepared and maintained in the form of alcoholic solutions and used in small concentrations they are not considered to be significant sources of contamination. Aqueous flavour extracts may be sanitized by pasteurization at 63 °C for 30 minutes without any serious injury to the flavour.

6.6.1.2 Colour solutions shall be added to the mix after pasteurization and aqueous solutions of colours may be heavily contaminated particularly when they are purchased from the market and are stored at room temperature. Such solutions shall be pasteurized by heating at 63 °C for 30 minutes and then used. It is, however, preferable to purchase dry colours and prepare the solutions in the plant as and when required. The dry colours may be dissolved in hot water (80 °C) or 45 percent sucrose solution and boiled for 2 minutes. They should be held in a sterile glass jugs provided with screw caps (corks are not suitable) and stored in the refrigerator. Old solutions should be re pasteurized by heating at 63 °C for 30 minutes before use.

6.6.2 Stabilizers and emulsifiers as permitted under the *Food Safety and Standards (Food Products Standards and Food Additives) Regulations*, 2011 not exceeding 0.5 percent by weight of the ice cream mix or *Kulfi* mix may be used. They shall be clean and free from any taste or odour and shall be protected from dust and contamination during storage. As the stabilizer is added to the mix in small concentrations before pasteurization, it does not contribute any significant contamination to ice cream and *Kulfi*, Gelatin, when used, shall be soaked in cold water for 15 minutes to 20 minutes and then heated to about 70 °C for 10 minutes before adding it to the mix.

7 HYGIENIC REQUIREMENTS

7.1 Raw Materials

7.1.1 Milk and milk products shall be of good hygienic quality. Milk and cream should be fresh and sweet, free from any off-flavours, or other defects and of low bacterial content. Condensed, evaporated and dried milk shall be free from rancidity, gassiness and off-flavours. Butter shall be fresh and free from rancidity and off-flavours.

7.1.2 Milk and milk products shall be received in clean and sterile containers, cooled immediately to a temperature not exceeding 4 ºC to 5 ºC (wherever applicable), and maintained at that temperature till they are required for use in preparing the mix.

7.1.3 Properly prepared matured fruit free from piths, seeds, skin and core, where necessary, may be used. The fruit may be fresh or processed (such as canned, frozen etc.). Currants, figs, dates, prunes or raisins in the dried form may also be used. Canned fruits shall comply with the requirements of the *Food Safety and Standards (Food Products Standards and Food Additives) Regulations*, 2011.

7.1.3.1 Fresh fruits shall be free from any physical damage or signs of spoilage. Fresh fruit juices shall be used immediately after preparation and if required to be kept, shall be stored in clean containers at a temperature not exceeding 4 ºC to 5 ºC.

7.1.3.2 Frozen fruits and canned materials after opening the pack shall be preserved in the cold store in their original containers and required quantities withdrawn periodically using sterile dippers or other utensils. Except in the case of canned and heat-sterilized materials all other fruits and fruit preparations shall be subjected to suitable bactericidal treatments (indicated below) before adding to the mix. Drastic heating or treatment with disinfectants other than dilute chlorine solution as indicated shall be avoided. In all cases clean and sterile containers shall be used for holding the fruits during treatment and while transferring the treated materials to the freezer every care shall be taken to prevent recontamination from hands or utensils.

7.1.3.3 *Strawberries, raspberries, blackberries and cherries*

The berries shall be washed with clean water, crushed if necessary, mixed with some sugar and then pasteurized by heating at 63 °C for half an hour or heated to boiling for a few minutes.

7.1.3.4 *Mangoes and peaches*

Mangoes and peaches shall be washed with suitable food grade sanitizing solution and washed with clean water before peeling. Peeled mangoes and peaches may be mixed with sugar and boiled gently for a few minutes or just dipped in boiling water for one minute and cooled in cold water.

7.1.3.5 *Oranges and lemons*

Oranges and lemons shall be washed in water, dipped in suitable food grade sanitizing solution for one minute, rinsed with clean cold water and then used for extracting juice. The utensils and appliances used for extracting or, handling the juice shall be clean and sterile.

7.1.3.6 *Bananas*

The skin shall be peeled off with the hands, cleaned and washed in suitable food grade sanitizing solution and then fruit shall be crushed or cut into pieces and transferred to the mix using clean and sterile utensils and appliances throughout.

7.1.3.7 *Dried fruits*

Dried fruits are generally required to be washed with water and then cooked in boiling water for some time to soften them before use. This treatment ensures the elimination of a major portion of contamination including pathogens.

7.1.4 The fruit juices used may be fresh, canned or concentrated, and the latter two types shall, where applicable, comply with the requirements of the *Food Safety and Standards (Food Products Standards and Food Additives) Regulations*, 2011.

7.1.4.1 Fruit juices shall be pasteurized by heating at 63 °C for 30 minutes for reducing bacterial contamination and destroying pathogens.

7.1.5 Nuts, free from rancidity and from insect and rodent contamination, may be added to the product.

7.1.5.1 Various nuts, such as walnuts, almonds, pistachio, cashew nuts, peanuts and chestnuts are added to the mix in the freezer. As they are likely to be heavily contaminated, depending on the sanitary conditions of their preparation and handling, it is necessary to subject the nuts to one of the bactericidal treatments mentioned below:

a) The nuts should be soaked for 15 seconds in boiling sugar solution (50 percent concentration) containing one percent salt and then dried for 2 minutes to 3 minutes in an oven at 250 °C. Instead of sugar solution, the nuts may be dipped in hot butter at 97 °C and then dried in an oven;

b) Nuts having 12 percent to 21 percent moisture content may be heated in an oven at 72 °C for 30 minutes maintaining the relative humidity at 70 percent. For nuts of lower moisture content, the temperature shall have to be raised to about 84 °C; and

c) The nuts may also be roasted gently in an oven (70 ºC to 80 ºC) either dry or using a little butter. The treated nuts shall be stored in glass bottles or tin cans at room temperature and protected from contamination during storage or handling.

7.1.6 *Eggs*

When used Shall be Fresh**.**

7.1.7 *Chocolate and Cocoa*

7.1.7.1 Cocoa or liquor chocolate of good quality shall be obtained and stored in a clean and cool place. If a chocolate mix is to be made separately the cocoa or chocolate shall be added to the mix prior to pasteurization and homogenization which will reduce the contamination from this source.

7.1.7.2 If, however, the chocolate is required to be added to a few batches of the mix in the freezer, a syrup containing cocoa, sugar and water in suitable proportions shall be prepared, first heated at 90 °C to 95 °C for 15 minutes to 20 minutes. It may then be cooled down and added to the mix in the freezer. If sterilized chocolate syrups in sealed tins are available in the market, they may be directly added to the mix, opened tins containing the syrup shall be properly covered and held in the cold store.

7.2 Ice Cream Mix/*Kulfi* Mix and the Final Product

7.2.1 The products shall be processed, packed, stored and distributed under strictly hygienic conditions (*see* IS 2491). Contamination shall be absolutely avoided.

7.2.2 The entire mix, excluding flavour(s), fruits, nuts and colouring shall be pasteurized at a temperature and for a period which ensures the destruction of all pathogenic organisms and gives a negative phosphatase test. The mix shall be immediately cooled to a temperature not exceeding 8 °C. After pasteurization of the mix, no ingredient other than fruit, fruit pulp, fruit juice, nuts, colouring and flavouring shall be added.

7.2.2.1 *Heat treatment*

The terms ‘Heat Treatment’, ‘Pasteurization’ or ‘Pasteurized’ and similar terms shall be taken to refer to the process of heating every particle of mix to a temperature of not less than 68.5 ºC and holding it at such temperature continuously for at least 30 minutes, or to a temperature of not less than 80 °C and holding at such temperature continuously for at least 25 seconds in approved and properly operated equipment; provided that nothing contained in this definition shall be construed as debarring any other process which has been demonstrated to be equally efficient.

7.2.2.2 The mix shall be cooled to 8 °C within one and a half hour of heat treatment and if required to be aged shall be maintained at 8 °C for a suitable period.

7.2.3 The ice cream and *Kulfi* shall be hardened and stored in a room/cabinet which is maintained at a temperature of -18 ºC or lower. No product other than ice cream, *Kulfi* and other frozen desserts shall be kept in the hardening and storage rooms/cabinets.

7.2.4 The cleaning and sterilization of milk handling equipment and the product containers shall be carried as per IS 5253.

8 PACKING AND MARKING

8.1 Packing

All the materials used for wrapping or packaging the ice-cream shall be of such a nature as to impart no off-flavour or odour, nor in any other way contaminate the product packed under normal conditions of manufacture, storage and use. Any material which comes in direct contact with food or likely to come in contact with food used for packaging, preparation, storing, wrapping, transportation and sale or service of food shall be of food grade quality. In addition to the above every packaging material used shall be conforming to the requirements specified under the *Food Safety and Standards (Packaging) Regulations*, 2018.

8.1.1 Containers made from either paper-board, metallic foil, multilayered flexible plastic laminates, thermoformed plastic container shall be of adequate strength for the weight of product carried to withstand normal handling during use. The containers shall also be strong enough to withstand the operations of automatic filling and capping machines. Paper-board containers shall be made water-resistant by coating or impregnation with suitable lamination or coating. The melting point of the wax, if used, in this process shall be not less than 49 °C. Wrapped spoons shall be supplied with small non-returnable containers.

8.1.2 If the ice-cream containers are placed in secondary/tertiary packages, the packages shall be clean, neat and unbroken.

8.1.3 Paper board ice-cream cups and cartons shall be adequately laminated or paraffined to make them impervious and in this process the surfaces also get sterilized. The articles shall be purchased in sanitary tubes, wrappings and cartons and the packages shall not be opened till required for use, the packages shall be stored in clean dust-proof cabinets. After removal from the tubes or cartons, the single service articles shall be kept in clean covered containers and protected from contamination from human hands, flies and other sources during handling. The hands shall be washed with a disinfecting solution before handling the articles.

8.1.4 If ice-cream cups are suspected to-be contaminated, they may be kept inverted over a wire-gauze and suitable food grade sanitizing solution sprayed into them from below so that the solution quickly drains out. Similarly, suitable food grade sanitizing solution may be sprayed over the laminated or paraffined surface of lids and spoons. Sticks may be sterilized by dipping in hot water (about 85 ºC).

8.2 Marking

8.2.1 The following information shall be marked legibly and indelibly on each container:

a) Name and type of the product;
b) List of the ingredients in the descending order;
c) Name and address of the manufacturer;
d) Batch or code number;
e) Month and year of manufacturing or packing;
f) Net quantity;
g) Direction for storage;
h) Expiry/use by (date, month & year); and
j) Any other requirements under the *Food Safety and Standards (Labelling and Display) Regulations*, 2020 and the *Legal Metrology Act*, 2009 and Rules framed thereunder.

8.2.2 *BIS Certification Marking*

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

9 SAMPLING

Representative samples of the material shall be drawn as prescribed in Annex E.

10 QUALITY OF REAGENTS

10.1 Unless specified otherwise, pure chemicals shall be employed in tests and distilled water (*see* IS 1070) shall be used where the use of water as a reagent is intended.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

ANNEX A

(*Clause* 2)

LIST OF REFERRED STANDARDS

IS No./Other Publication	*Title*
IS 1070 : 1992	Reagent grade water — Specification (*third revision*)
IS 1479 (Part 1) : 2016	Methods of test for dairy industry : Part 1 Rapid examination of milk (*first revision*)
IS 2491 : 2013	Food hygiene — General principles — Code of practice (*third revision*)
IS 5253 : 1969	Guidelines for cleaning and sterilizing dairy equipment
IS 5401 (Part 1) : 2012/ISO 4832 : 2006	Microbiology of food and animal feeding stuffs — Horizontal method for the detection and enumeration of coliforms — Part 1 Colony count technique (*second revision*)
IS 5402 (Part 2) : 2021/ISO 4833-2 : 2013	Microbiology of the food chain — Horizontal method for the enumeration of microorganisms : Part 2 Colony count at 30 °C by the surface plating technique (*third revision*)
IS 5887	Methods for detection of bacteria responsible for food poisoning
(Part 1) : 1976	Isolation, identification and enumeration of *Escherichia coli* (*first revision*)
(Part 3/Sec 1) : 2020/ISO 6579-1 : 2017	Horizontal method for the detection, enumeration and serotyping of *Salmonella*, Section 1 Detection of *Salmonella* spp. (*third revision*)
(Part 6) : 2012/ISO 7932 : 2004	Horizontal method for the enumeration of presumptive *Bacillus cereus* — Colony count technique at 30 °C (*first revision*)
(Part 8/Sec 1) : 2002/ISO 6888-1 : 1999	Horizontal method for enumeration of coagulase-positive Staphylococci (*Staphylococcus aureus* and Other Species), Section 1 Technique using Baird-Parker agar medium
(Part 8/Sec 2) : 2002/ISO 6888-2 : 1999	Horizontal method for enumeration of coagulase — positive (*Staphylococcus aureus* and Other Species), Section 2 Technique using rabbit plasma fibrinogen agar medium
IS 7224 : 2006	Iodized salt, vacuum evaporated iodized salt and refined iodized salt — Specification (*second revision*)
IS 8479 (Part 1) : 1977	Method for determination of phosphatase activity in milk and milk products: Part 1 Routine method
IS 10500 : 2012	Drinking water — Specification (*second revision*)
IS 11762 : 2013/ISO 1737 : 2008	Method for determination of fat content in condensed milk and evaporated milk
IS 11764 : 2005/ISO 2911 : 2004	Sweetened condensed milk — Determination of sucrose content — Polarimetric method (*first revision*)
IS 11917 : 2018/ISO 8968-1 : 2014	Milk and milk products — Determination of nitrogen content — Kjeldahl principle and crude protein calculation (*first revision*)
IS 11963 : 2005/ISO 5548 : 2004	Caseins and caseinates — Determination of lactose content — Photometric method (*first revision*)
IS 12333 : 2017/ISO 6731 : 2010	Milk, cream and evaporated milk — Determination of total solids content — Reference method (*second revision*)
IS 13688 : 2020	Packaged pasteurized milk — Specification (*second revision*)
IS 14988 (Part 1) : 2020/ISO 11290-1 : 2017	Microbiology of the food chain — Horizontal method for detection and enumeration of *Listeria monocytogenes* and of *Listeria* spp.: Part 1 Detection method (*first revision*)

IS No./Other Publication	*Title*
IS 16424 : 2016/ISO 7251 : 2005	Microbiology of food and animal feeding stuffs — Horizontal method for the detection and enumeration of presumptive *Escherichia coli* — Most probable number technique
ISO 15213 : 2003	Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of sulfite-reducing bacteria growing under anaerobic conditions

ANNEX B

[*Table* 1, *Item* (i)]

DETERMINATION OF WEIGHT PER LITRE AND OVER-RUN IN ICE CREAM OR *KULFI*

B-1 GENERAL

B-1.1 The determination of over-run in frozen and hardened ice cream or *Kulfi* is a somewhat complex problem to solve, due to the fact that the weight of mix is unknown and has to be determined before calculations can be made.

B-1.1.1 The over run in ice cream or *Kulfi* depends upon the amount of air whipped into the mix during the freezing process. In this test, the volume of water and alcohol used corresponds with the volume of air originally contained in the ice cream or *Kulfi* and the difference between the sum of these two and the capacity of the flask is equivalent to the volume occupied by the sample.

B-2 APPARATUS

B-2.1 Analytical Balance

Weighing accurately to 0.001 g.

B-2.2 Beaker — 400 ml

B-2.3 Volumetric Flask — 250 ml

B-2.4 Glass Funnel

B-3 REAGENT

B-3.1 *n*-amyl Alcohol — sp gr 0.817

B-4 PROCEDURE

B-4.1 Weigh a unit of ice cream or *Kulfi* and from it calculate the weight of the ice cream or *Kulfi* per litre. For example, 200 ml of a full carton of ice cream or *Kulfi* can be obtained, the ice cream or *Kulfi* carefully removed and the empty dry carton weighed. The difference in weights between the carton when filled and when empty is, therefore, the weight of 200 ml of frozen ice cream or *Kulfi*. Five times this weight would then equal the weight of a litre. To determine the weight of the mix, proceed as given in **B-4.1.1**.

B-4.1.1 Weigh and record the exact weight of a clean, dry 400 ml beaker. Into the beaker weigh exactly 130 g of the frozen ice cream or *Kulfi*. Place the beaker in water-bath warmed to 49 °C and melt. Weigh and record the exact weight of a 250 ml volumetric flask. Using a glass funnel, transfer 130 g of melted ice cream or *Kulfi* into the 250 ml flask. Add exactly 10 g of *n*-amyl alcohol to the flask and mix to break the surface tension of the melted ice cream or *Kulfi* and release the incorporated air. 10 g of *n*-amyl alcohol occupy a volume of 12.24 ml. Cool the flask with contents to 15.5 ºC using a cold water or ice water-bath. Rinse the beaker containing melted mix with several small rinsing of distilled water, adding each rinse to the 250 ml flask. Again cool the flask with contents to 15.5 ºC and using the final rinse water, bring the volume to 250 ml mark. The bottom of the meniscus should correspond with the mark when temperature is exactly 15.5 °C. Dry the outside of the flask and reweigh.

B-4.2 Calculate the weight in grams of the contents, Calculate the weight in grams of water added to the flask. Calculate the volume in millilitres occupied by the sample of ice cream or *Kulfi*. Determine the specific gravity of the mix by dividing its weight (130 g) by the volume in millilitres which it occupied. Determine the weight in grams per litre of mix by multiplying by the specific gravity.

NOTE — After weighing the unit of ice cream or *Kulfi*, it is essential to remove the carton carefully without tearing and dry it thoroughly before reweighing. If the ice cream or *Kulfi* has been heat-shocked, accurate results can not be obtained.

ANNEX C

[*Table* 1, *Item* (vi)]

DETERMINATION OF SUCROSE

C-1 REAGENTS

C-1.1 Fehling's Solution

Prepare by mixing equal volumes of Solution A (**C-1.2**) and Solution B (**C-1.3**) immediately before using.

20 ml = approximately 40 ml of 0.25 percent invert sugar solution

C-1.1.1 *Standardization of Fehling's Solution*

Pipette accurately 20 ml of Fehling's solution prepared as above into a 250 ml conical flask. Add from a burette a volume about one millilitre less than toe expected volume of standard dilute invert sugar solution which will reduce the Fehling's solution completely (about 40 ml) and sufficient water to bring the volume to 75 ml at the commencement of boiling. Heat rapidly to boiling on asbestos gauge. Reduce the heat sufficiently to maintain slow but steady boiling, and in two minutes from the onset of boiling add one millilitre of methylene blue solution. Add small quantities of the standard invert solution until the indicator is decolorized. The titration must be completed in about three minutes, excluding air by maintaining ebullition, and refraining from rotating or shaking the flask throughout. After this preliminary titration a further titration or titrations should be carried out, adding practically the whole of the invert sugar solution required before commencing the heating and continuing the titration as before.

C-1.1.2 The colour change is best judged in good daylight or its equivalent and it is recommended that the boiling should be carried out on a clean white asbestos gauze or a thin white silica tile.

C-1.1.3 From the volume of invert sugar used, calculate the equivalent of 20 ml of Fehling's solution in terms of milligrams (X) of Invert sugar.

C-1.2 Copper Sulphate Solution (Solution A)

Dissolve 34.639 g of $CuSO_4.5H_2O$ in water, dilute to 500 ml and filter if necessary.

C-1.3 Potassium Sodium Tartrate (Rochelle Salt) Solution (Solution B)

Dissolve 173 g of potassium sodium tartrate and 50 g of sodium hydroxide in water, dilute to 500 ml and filter if necessary through asbestos.

C-1.4 Hydrochloric Acid — Density 1.18 at 20 °C. Approximately 12 N.

C-1.5 Hydrochloric Acid — 6.34 N

C-1.6 Alumina Cream

To a cold saturated solution of aluminium potassium sulphate in water add sufficient aqueous ammonia (density 0.880) stirring constantly, to make the mixing alkaline to litmus paper. Wash with water, by decantation, allowing the gelatinous precipitate to settle thoroughly between each washing, until only a trace of sulphate remains in the washings.

C-1.7 Neutral Lead Acetate Solution

Prepare a concentrated solution of lead acetate in cold water, neutralize if necessary to litmus paper by adding acetic acid or sodium hydroxide, dilute to a density of approximately 1.25 at 20 °C and filter. This requires the solution of about 41 g of lead acetate diluted to a final volume of 100 ml, after neutralization.

C-1.8 Sodium Oxalate Solution — Saturated solution in water.

C-1.9 Methylene Blue Indicator — 0.2 percent in Water.

C-1.10 Sodium Hydroxide — Approximately 1 N

C-1.11 Standard Invert Sugar Solution

C-1.12 Stock Invert Sugar Solution

Transfer 23.75 g of sucrose, dried overnight in a vacuum desiccator, to a one-litre graduated flask with the aid of about 100 ml of water. Add 10 ml of concentrated hydrochloric acid, mix thoroughly and allow to stand for at least three days at a temperature approximating to 20 ºC. Dilute to one litre. This stock solution contains 2.5 g of invert sugar per 100 ml and may be kept for up to four weeks without changing its concentration.

C-1.13 Standard Dilute Invert Sugar Solution

C-1.13.1 Transfer 50 ml of the stock solution, make just neutral to litmus paper with 1 N sodium hydroxide solution and dilute to 500 ml immediately before use.

1 ml = 2.5 mg invert sugar

C-1.13.2 The above procedure is recommended, but where it is necessary to use a rapidly prepared solution, transfer 1.187 5 g of dried sucrose to a 500 ml flask with 75 ml of water. Add 10 ml of 6.34 N of hydrochloric acid slowly while rotating the flask. Partially immerse the flask in a water-bath adjusted to 70 °C and when the temperature of the contents reaches 67 °C (which should occupy $2\frac{1}{2}$ minutes to $2\frac{3}{4}$ minutes) allow five minutes further heating by which time the temperature should have reached about 69.5 °C. Remove the flask and cool immediately by immersing in a water-bath at 20 ºC. When the contents of the flask have nearly reached 20 ºC, make just neutral to litmus with 1 N sodium hydroxide solution and dilute to 500 ml at 20 °C.

1 ml = 2.5 mg invert sugar

C-2 PROCEDURE

C-2.1 Determination of Original Reducing Sugars

Place about 10 g of the prepared sample of ice cream or *Kulfi* (*see* **E-4.3**) accurately weighed (it is convenient to weigh by difference) into a 250 ml conical flask and dilute with 150 ml of water. Mix thoroughly the contents of the flask. Add neutral lead acetate drop by drop, mixing by rotating the flask until no further precipitate is formed. Add one drop of alumina cream, again mix and allow to stand for a few minutes. Rotate the flask at intervals to ensure complete precipitation of protein. Add just sufficient sodium oxalate solution to precipitate any excess lead. Filter through a fluted 18 cm No. filter paper into a 250 ml graduated flask. Wash the precipitate and the paper thoroughly, with hot water collecting the washings in the flask. Cool the flask and contents and make up to the mark (Solution C). Carry out titrations against Fehling's solution prepared and standardized as above.

C-2.1.1 If the weight of sample taken is W g and the volume of sugar solution used in the titration is S ml then the percentage of original reducing sugar in the ice cream or *Kulfi*

$$= \frac{25\,X}{SW}$$

C-2.1.2 The concentration of reducing sugar in the filtered solution may be such that more than 55 ml are required to reduce 20 ml mixed Fehling's solution. In this case employ the following modification.

C-2.1.3 Pipette 10 ml each of Fehling's solution prepared .and standardized as above into the flask, add an accurately known volume of the standard dilute invert sugar solution, and complete the titration with the prepared sugar filtrate as described under standardization of Fehling's solution, Substract from the number of milligrams of invert sugar found, the amount contained in the known volume of standard invert sugar solution added.

C-2.2 Determination or Reducing Sugars After Inversion

Transfer 50 ml of the filtered solution (Solution C) to a 200 ml graduated flask, add 25 ml of water and 10 ml of 6.34 N hydrochloric acid. Invert as described in the preparation of standard dilute invert sugar solution. Determine the total invert sugar as described in the determination of reducing sugars.

C-3 CALCULATION

Sucrose = [(reducing sugars after inversion) − (original reducing sugars)] x 0.95

ANNEX D

(*Table* 2)

SAMPLING PLAN FOR MICROBIOLOGICAL REQUIREMENTS

D-1 SAMPLING PLAN FOR MICROBIOLOGICAL REQUIREMENTS

The terms *n*, *c*, *m* and *M* used in this standard have the following meaning:

n = Number of units comprising a sample.

c = Maximum allowable number of units having microbiological counts above *m* for 2-class sampling plan and between *m* and *M* for 3-class sampling plan.

m = Microbiological limit that separates unsatisfactory from satisfactory in a 2-class sampling plan or acceptable from satisfactory in a 3-class sampling plan.

M = Microbiological limit that separates unsatisfactory from satisfactory in a 3-class sampling plan.

D-2 INTERPRETATION OF RESULTS

2-*Class Sampling Plan (where n, c and m are specified)*	3-*Class Sampling Plan (where n, c, m and M are specified)*
1. Satisfactory, if all the values observed are ≤ *m*	1. Satisfactory, if all the values observed are ≤ *m*
2. Unsatisfactory, if one or more of the values observed are > *m* or more than *c* values are > *m*	2. Acceptable, if a maximum of *c* values are between *m* and *M* and the rest of the values are observed as < *m*
	3. Unsatisfactory, if one or more of the values observed are > *M* or more than *c* values are > *m*

ANNEX E

(*Clause* 9)

SAMPLING OF ICE CREAM OR *KULFI*

E-0 GENERAL

General observations given for sampling of milk under **4** of IS 1479 (Part 1) should be borne in mind while sampling ice cream and *Kulfi*.

E-1 SELECTION OF SAMPLE

If the product is supplied in bulk units, the number of units to be selected for sampling shall normally be as follows:

Sl No.	*Total Number of Units*	*Number of Units to be Selected*
(1)	(2)	(3)
i)	1 to 100	1
ii)	101 to 1 000	2
iii)	1 001 to 10 000	4
iv)	Over 10 000	4 plus one for each additional 2 500 units or fraction thereof

NOTE — The samples shall consist of the unopened retail unit(s) selected.

E-2 SAMPLE CONTAINERS

Wide-mouth jars (dimension of mouth about 4.5 cm, capacity 100 g to 200 g) shall be made of glass, metal or other suitable material which can be sterilized easily. The jars shall be closed by means of a screw cap or suitable closure made of fat-proof, non-absorbent, insoluble material, which will not impart any foreign odour or taste to the contents. If desired, the sample jars may be sand-blasted over a suitable area for inscription.

E-3 STORAGE AND TRANSPORT OF SAMPLES

The samples shall be stored at a temperature not higher than -15 °C. Samples shall be protected from light during storage. During transit the samples shall be maintained at a temperature not exceeding - 15 ºC.

E-4 SAMPLING FOR CHEMICAL ANALYSIS

E-4.1 Containers

The sterile jars used for collecting the sample shall be placed in a thermally insulated transport container not less than 30 minutes before use.

E-4.2 Size of Sample

Any sample of ice cream or *Kulfi* shall not be less than 100 g. If necessary several packages of smaller size shall be taken to make up the required size of sample, When the resulting sample is to be divided into two or more parts a correspondingly larger amount shall be taken to enable each part to be of the specified sample size.

E-4.3 Type of Sample

E-4.3.1 *Plain Products*

Let the sample soften, at room temperature. Because melted fat tends to separate and rises to the surface, it is not advisable to soften the sample by heating on water-bath or over flame. Mix thoroughly by stirring with spoon or egg beater or by pouring back and forth between beakers.

E-4.3.2 *Ice Cream and Kulfi Containing Fruits Nuts and Chocolate etc which may have Insoluble Particles*

E-4.3.2.1 Use a mixer capable of comminuting product to fine, uniform pulp. Use l00 g to 200 g of sample to fill the cup of mixer full to about one- third. Melt the product at room temperature or in an incubator at 37 °C in closed container. Transfer entire contents to the mixer cup and mix, until insoluble particles are finely divided (about 3 minutes to 5 minutes for fruit ices and up to 1 minute for nut ices). Alternatively, the product maybe ground in a porcelain or glass pestle and mortar.

E-4.3.2.2 Transfer the mixed sample to a suitable container for convenience in weighing. After weighing operations, return the remainder of the sample to the refrigerator, preferably at a temperature not exceeding -15 ºC.

E-4.4 Sub-Division of Sample

Where it is required that a sample is to be sub-divided the following methods, observing the maximum possible hygiene, are recommended:

a) Packages of Ice Cream or *Kulfi*

Expose the ice cream or *Kulfi*. With the help of a suitable sterile implement, for example, a sharp knife or spoon, sub-divide the ice cream into the required number of approximately equal parts and place one part from each package into a separate sample jar. Repeat this operation until each jar contains the required amount of ice cream or *Kulfi*.

b) Multi-Layered Ice Cream or *Kulfi*

In the case of multi-layered ice cream or *Kulfi*, the sample shall be such as to contain the same proportion of each layer as is present in the original ice cream or *Kulfi*. Different layers shall not be separated at the time of sampling and a complete sample of all layers shall be placed in the sample jar.

c) Bulk Container of Ice Cream or *Kulfi*

First remove the surface layer with a sterile spoon or other suitable sterile implement. With a second sterile implement, remove the required number of portions from each of several different sites to make up a sample representative of the bulk.

E-5 SAMPLING FOR BACTERIOLOGICAL EXAMINATION

E-5.1 For bacteriological purposes, all equipment including sample bottles, spoons, knives, etc. shall be clean and sterile. Equipment shall be sterilized by one of the following methods:

a) Hot air-oven for 2 hours at 160 °C to 170 °C;
b) Autoclave for 15 minutes at 120 °C;
c) Steam for 1 hour at 100 °C (equipment treated by this method shall be used within 24 h); and
d) Immersion for at least 5 minutes in boiling water (equipment treated by this method shall be used immediately).

E-5.2 Packages

One or more unopened packages shall constitute the sample, which shall be delivered intact to the laboratory in a sterile sample jar.

E-5.3 Multi-Layered Ice Cream or *Kulfi*

In the case of multi-layered ice cream or *Kulfi*, the sample shall be such as to contain the same proportions of each layer as are present in the original ice cream or *Kulfi*. Different layers shall not be separated at the time of sampling and a complete sample or not less than 25 g and containing all the layers shall be placed in the sample jar.

E-5.4 Bulk Containers

First remove the surface layer with a sterile spoon or other suitable implement. With a second sterile implement, take a sample of not less than 25 g from the freshly exposed surface of the bulk and transfer to a sterile sample jar with the usual aseptic precautions.

E-5.4.1 When it is desired to obtain information about the hygienic condition of the surfaces of the bulk ice cream or *Kulfi*, take a sample from the surface layer for examination, with a sterile spoon as described above. When information is required regarding the ice cream and *Kulfi* as served to the consumer, the server normally used for dispensing the ice cream and *Kulfi* should be employed.

ANNEX F

(*Foreword*)

COMMITTEE COMPOSITION

Dairy Products and Equipment Sectional Committee, FAD 19

Organization	*Representative(s)*
National Dairy Research Institute, Karnal	Dr Manmohan Singh Chauhan (***Chairperson***)
All India Food Processors Association, New Delhi	Dr K. L. Gaba Shri Vijay Gaur (*Alternate*)
Bihar State Cooperative Milk Producers' Federation Limited, (COMPFED), Patna	Shri Sushil Kumar Shri Rupesh Raj (*Alternate*)
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Panel for Revision of Indian Standards on Dairy Foods, FAD 19/Panel IV

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